Fermilab Annual Ecological Land Management Plan

For Calendar Year 2001

Developed by

The Fermilab Ecological Land Management Committee

3/1/01

I. Introduction

The Ecological Land Management Committee prepares the Fermilab Annual Ecological Land Management Plan for approval by the Fermilab Director. The first part of the Plan lists the most significant accomplishments during CY 2000. The second part of the plan contains the Committee's recommendations for a coherent, prioritized set of activities for Calendar Year 2001, which incrementally advances the goals in the Long Range Ecological Land Management Plan. The Committee makes these recommendations with the suggestion that resources, which the Lab can make available for ecological land management, be applied to these activities. It is understood that the judgment of those doing the work will prevail on the details of implementation and that changes in scope and detail will occur.

The Fermilab Land Management Plan Map (See CY 2001 Fermilab Land Management Map) is updated annually to reflect changes in land usage.

II. Ecological Land Management Accomplishments in Calendar Year 2000

A summary of activities throughout the site is listed below. The attached ELM Tract Annual Management Plan Sheets detail accomplishments in each ELM tract.

A. Harvests

1. The attendance at the volunteer harvests in 2000 exceeded 400 people. Some of the more conservative forbs collected include bush clover, white wild indigo, prairie sunflower, nodding wild onion, wild quinine, and prairie coreopsis. Seed from wood lily, Culver's root, prairie sunflower, spiderwort, and bottle gentian was hand collected in the remnant prairie at the Burlington Railroad.
2. One trip was made to Markham Prairie. Species of plants collected included white and purple prairie clover, blazing star, prairie dropseed, and cowbane.
3. Prairie seed was machine harvested in ELM tracts 10, 11, 13, 14 and 20. More than 8,000 pounds of prairie matrix seed was collected.
4. Fermilab traded, with a commercial vendor, approximately 5500 pounds of big bluestem seed for various native species needed for enrichment of the existing tracts. These were the types of plants commonly found in fully developed, mature prairies, yet still rare in the Fermilab prairie tracts. Fermilab also acquired little bluestem seed to develop a small nursery for future projects.

B. Tracts Enriched

1. Parts of ELM tracts 1 and 25 were drilled with an enrichment mix. An enrichment mix was broadcast in parts of ELM tracts 1 and 4.

2. About 100 people planted about 125 new trees and bushes in the northern part of ELM 24 during the 2000 Arbor Day activities (See Arbor Day). Species planted included bur oak, black walnut, American plum, white oak, and hawthorns. About half these trees were taken from ELM 4, where they were growing too close together.

C. New Prairie Planted

Approximately 9 acres of new prairie were planted in ELM 4.

D. Ongoing Improvement Programs

1. As part of the noxious weed control program, teasel was sprayed in ELM tracts 19, 20, 24, 25, and 26. Loosestrife control was conducted in ELM tracts 1, 9, 11, 14, and 15; buckthorn and honeysuckle in ELM tracts 24 and 25; and cottonwood in ELM 1. Roads and Grounds, who conducts the control program, reports that the resources available do not keep up with the spread of these exotic species. The number of areas where they are found continues to grow annually.
2. Parts of ELM tracts 1, 2, 3, 4, 23 24, 25 and 28 were burned. The east half of ELM 14 was burned. A prairie burn history and plan was developed.
3. The water was pumped out of the Village Oxidation Pond and the piping and spray apparatus removed. The Pond, maintained in that state through the summer, dried out. The elevation at the bottom of the Oxidation Pond is 716.5 feet, and the boards in the A.E. Sea discharge structure are set at 718.0 feet. The Committee supports a management strategy for the A.E. Sea / Dusaf ponds that would maintain the water level at 717.0 feet. The resulting seasonal fluctuations above and below this level would allow significant improvement and development of a quality wetland in the Oxidation Pond after removal of the berm.

4. The Committee recommends continuation of the project to develop the Village Oxidation Pond as a wetland.
5. The committee also recommends the Lab continue with the implementation of

   a plan to improve maintenance of ELM14. Since nesting Bell's Vireos returned to the section that was burned in CY1999, the burning program should continue. The committee recommends that the east half of the tract be burned this year and that the west half be left untouched.
6. The Committee continues to support a modest program of planting little bluestem as a method of finding if the conditions at Fermilab will support establishing it where short grasses are wanted to encourage the nesting of grassland birds.

E. Status of Flora and Fauna

1. Status of Flora at Fermilab

Robert F. Betz (See Botanical Report-Fermilab 2000) prepared the annual status report of flora on-site.

New Species

During the 2000 growing season one new native plant was found at Fermilab. This was the prairie sundrops (*Oenothera pilosella*) found in ELM-1 (Plot #11) on June 8th and in ELM-25 (Plot #17) on June 7th. Hopefully, if everything goes well, this colony-forming perennial should eventually blanket the low prairies with hundreds of bright yellow flowers during the months of June and July.

With this additional species, there are now 259 native prairie and prairie marsh species and 195 species of native tree and shrub species

found at Fermilab. In addition, there are 168 non-native (exotic) herbaceous weeds and 30 species of non-native trees and shrubs. In total, there are 652 species. Most, but not all, of the non-native species are confined to roadsides, ditches, berms, old farm sites, and other disturbed areas.

Changes in Prairie Plant Populations

Populations of prairie of both First and Second Stages continue their increase. This is especially true in ELM-1, ELM-25, and ELM-26. Examples of some of these first stage plants are: nodding wild onion (*Allium cernuum*), white wild indigo (*Baptisia leucantha*), round-headed bush clover (*Lespedeza capitata*), and golden Alexanders (*Zizia aurea*); examples of second stage plants are: prairie sedge (*Carex bicknellii*), prairie rattlesnake master (*Eryngium yuccifolium*), marsh blazing star (*Liatris spicata*), prairie betony (*Pedicularis canadensis*), and Culver's root (*Veronicastrum virginicum*).

Twenty-two species were recorded in tracts where they had not been previously observed, such as white wild indigo (*Baptisia leucantha*) in ELM-26 (Mitigation Area), button blazing star (*Liatris aspera*) in ELM-25 (Plot #14), and cowbane (*Oxypolis rigidior*) in ELM-25 (Plot #16).

Two small populations of the relatively uncommon Turk's cap lily (*Lilium michiganense*) were found in ELM-26. Isolated plants were also recorded in the Brome grassland near the northeast corner of Batavia and Eola Roads in ELM-16, ELM-1 (Plot #4), and ELM-4 (Plot #12).

Changes in the Marshes

The prairie marshes continue to show increased populations of bulrushes, spike rushes, sedges, various mints, cardinal flowers, bonesets,

and monkey flowers. Fog fruit (*Lippia lanceolata*) was found for the first time in marsh in ELM-1 (Plot #11).

Changes in the Woods

Woodland wildflowers are continuing to recover from the effects caused by the overpopulation of deer. Last spring there were more woodland phlox (*Phlox divaricata*), wood mint (*Blephilia hirsuta*), and the two touch-me-nots (*Impatiens sp.*) over the previous years.

Weed Problems

As the native natural communities at Fermilab move toward later ecological stages, it is less likely that weed species can penetrate into them. However, with areas continually being disturbed by cultivation, compaction of soil by heavy machinery, movement of soil from one place to another, salting of highways, etc., weeds will find a sanctuary.

It appears that both the cut-leaved teasel (*Dipsacus laciniatus*) along Fermilab roads and the purple loosestrife (*Lythrum salicaria*) are being adequately controlled by the Department of Roads and Grounds.

The oriental bittersweet (*Celastrus orbiculatus*) has been temporarily exterminated from Fermilab.

The common reed (*Phragmites australis*) still continues its slow inexorable invasion of the marshes and the extermination of the two native cattails (*Typha angustifolia* and *T. latifolia*).

Seed Production

There was a very noticeable increase in seed production of two prairie legumes that were prevented from producing seed for many years due to

the heavy grazing of their blooms by deer. They are the white wild indigo (*Baptisia leucantha*) and the showy tick trefoil (*Desmodium canadense*). For a number of years little or no seed was produced. Last year (1999) there was only a slight increase in seed and pod production. However, this year (2000) there was little or almost no destruction of the blooms by deer. The seed harvest has been one of the best in the history of the Fermilab prairie.

There are two species of true lilies at Fermilab: the prairie (*Lilium philadelphicum andinum*) found in only three places and the Turk's cap (*L. michiganense*) in ten places. Even though these small isolated colonies have been pollinated by prairie insects, they have never been known to produce pods or viable seed. This is probably due to the fact that most, if not all these small isolated colonies are genetically related and require out-crossing (or cross-pollination) to produce pods with viable seeds.

During the summer of 2000, Jennifer Rudderham, a summer student working at Fermilab, cross-pollinated these isolated lily colonies. She did this by cutting off the male stamens with their anther-containing pollen and with small forceps rubbing the anther-pollen onto the stigma of flowers in these isolated colonies. The result was 15 pods of Turk's cap lily and 12 pods of prairie lily, which appeared to have viable seed. The seeds will mostly be planted in ecologically advanced areas in the developing prairie protected by chain-link fences. (Note: deer just love to eat lilies and their blossoms).

Jennifer was also instrumental in collecting seeds of small plant species at Fermilab that are almost never collected because of the difficulty in finding them in the rank mid-summer vegetation. Two of them were the blue-eyed grass (*Sisyrinchium albidum*) and the yellow star-grass (*Hypoxis hirsuta*).

Total Seeds Collected

During the 2000-growing season, approximately 125 lbs. of cleaned prairie and prairie marsh seeds were either hand collected from approximately 71 species from the Markham, Hinsdale, and Fermilab prairies or received in trade from neighboring counties. In addition to these 71 prairie and prairie marsh species, 20 woodland and savanna species were also collected.

Comments

After more than a quarter century of restoration efforts to rebuild the prairie landscape at Fermilab, the pace of the restoration is quickening. Each year populations of late first and second stage plants are increasing and successfully competing and taming the big bluestem grass. More seed is being harvested from the Fermilab prairie for use in enriching the prairie. For all of us who are studying, working, and caring for the prairie it's an exciting time.

Additional information about ecological land management activities and facts is available in the Natural Areas Restoration site.

A database of some of the plants identified at Fermilab has been established in the Find Plants in the Fermilab Prairie site.

2. Status of the On-Site Bird Populations

Peter Kasper prepared the annual report on the on-site bird population, 2000 Fermilab Bird Report

Peter Kasper also maintains the on-going compilation of bird observations since 1987, The Birds of Fermilab.

3. Wildlife Management

White-tailed deer continue to be the major focus of wildlife management at Fermilab. The U.S. Department of Agriculture Wildlife Services group conducted deer removals from November 1998 until February 2000, bringing the herd closer to the target density of approximately 10 animals per square mile. Indications of rebound in forest understory plants continues to be visible.

In addition to these observations in the forest, two species have been identified as favorite forage for deer in the prairie; *Baptisia leucantha* and *Desmodium canadense* were observed to be more abundant in the center of the Main Ring and in the relatively young restoration along Kirk Road.

Comparison of browse lines around the site gave the impression that although there is still a noticeable browse line, it tends to be less defined than in years past.

Other wildlife species, including beaver, groundhogs, raccoons, and pigeons are controlled by the Roads and Grounds Department. Canada geese continue to constitute a nuisance species, however no controls have been implemented for them.

4. Status of Butterflies at Fermilab

Tom Peterson prepared the second annual report on a survey of butterflies on-site,
Butterfly Report—Fermilab—2000.

F. NERP Research Projects

Seven projects are currently underway with an additional four projects proposed and awaiting approval and / or funding.

Project	Location	Investigator(s)	Institution	Status
Assessment of the Impact of Biological Controls on Garlic Mustard (*Alliara petiolata*) and on Non-target Species in Forest Communities	Big Woods south of B Road	Vicky Nuzzo w/ Bernd Blossey	Natural Area Consultants and Cornell University	Continuing
Effects of Tree Removal on Recovery of Ground Cover in Big Woods at Fermilab	Big Woods south of B Road and west of creek	Liz Aicher	Northern Illinois University	Continuing
Grassland Habitat Study	TBD	Rickie White	National Audubon Society	Proposed
Arbuscular Mycorrhizal Fungi in Soil	Various	J. Jastrow & M. Miller	Argonne Natl. Lab	Proposed
Bird Species Composition at Fermilab (tent)	TBD	Fumiko Kanekawa	Northern Illinois University	Proposed
Species-specific Controls of Nutrient Cycling During Succession in Tallgrass Prairie	Various	Diana Lane	University of Illinois-Chicago	Continuing
Effect of species richness on the establishment and success of garlic mustard (*Alliaria petiolata*)	TBD	Roger Anderson	Illinois State University	Awaiting funding
Differences in Reproductive Success of Prairie Plant Species between Restored and Remnant Prairies	Various	Julie Jastrow	Argonne National Laboratory	Continuing
Carbon Sequestration in Terrestrial Ecosystems	ELM – 8	Julie Jastrow, et al.	U.S. DOE	Continuing
Bird Surveys at Fermilab	Site-wide	Peter Kasper w/ Denis Kania, Jack Pomatto	Fermilab and DuPage Birding Club	Continuing
Biodiversity of Arbuscular Mycorrhizal Fungi and the Success of the Prairie Restoration	ELM - 8	James Bever	U. California at Irvine	Continuing

G. Other Accomplishments/Special Projects

1. Friends of Fermilab donated money for the winter supply of birdseed for the Lederman Science and Education Center bird feeding area.
2. Several dozen trees came up from the seeds planted last year in ELM 8. An additional area was planted next to that plot with seeds from black walnut, shagbark and bitternut hickory, red and white oak, swamp white oak and butternut.
3. One year ago, the committee gained an expert on butterflies, Tom Peterson. Tom has completed his second survey to monitor the butterfly

population on-site. He walks a fixed route, with the same weather conditions (warm and sunny), around mid-day to record the number of species he sees. This is tabulated for the whole season. For each species, there will also be a peak total day. The monitoring is mostly done in June and July. The results will also be included in the Northern Illinois Monitor Network. The results of his 2000 work are included in this report—see Section E.

4. Fermilab continues to be an active member of Chicago Wilderness (CW). A display of the Fermilab Prairie Restoration was presented at the 3rd Annual "It's Wild in Chicago" event sponsored by CW at the Field Museum in Chicago in May. Also in May, Fermilab participated in the annual CW Congress meeting, to discuss the Regional Biodiversity Recovery Plan. The first of two seed-collecting days at the Lab was a participation effort in the National Public Lands Day regional event, sponsored by CW.
5. A program of burning was initiated in ELM 14. The maintenance program for ELM 14 calls for maintaining an intermediate successional state. The past program of removing 10% of the largest trees was not addressing the intrusion of various aggressive brush species and is resource intensive. In the spring of 1999 the west half of the tract was burned and then monitored to assess the impact on nesting Bell's Vireos. In the 1999 breeding season the birds only nested in the section not burned, but this year they also returned to the west half of the tract. In view of this success it would be desirable to burn the east half this year. Plans are to alternate sections burned, to control brush and to leave areas for the nesting birds.
6. The portion east of the remnant fence of ELM 17 has been licensed for AG land. The Committee supports this use of the tract.

7. Fermilab licensed an additional 325 acres of land to farmers in parcels contiguous to existing license areas. A new 25 acre license tract was established for the field south of the Pioneer Cemetery, and east of Receiving Road and Site 38.
8. Roads and Grounds planted native prairie seeds as a natural snow fence along Batavia Road, Eola North and the south side of West Wilson Road.
9. Installed Martin Houses and Owl nest boxes were installed as an Eagle Scout project.
10. Summer projects: Jennifer Rudderham provided prairie seed harvest and lily pollination assistance to Dr. Betz. She collected *Hypoxis hirsuta* (yellow star grass), *Sisyrinchium albidum* (common blue-eyed grass), *Allium canadense* (wild onion), *Phlox pilosa* (prairie phlox), *Panicum leibergii* (panic grass), *Carex bicknellii* (Bicknell sedge), *Scirpus lineatus* (red bulrush), *Polygala senega* (Seneca snakeroot), *Tradescantia ohiensis* (spiderwort), *Phlox glaberrima* (marsh phlox), *Zizia aurea* (golden alexanders), *Lobelia spicata* (pale-spike lobelia), *Galium obtusum* (wild madder), *Euphorbia corollata* (flowering spurge), *Baptisia leucantha* (white wild indigo), . She also collected the following woodland seeds: *Hydrastis canadensis* (golden seal), *Trillium grandiflorum* (large white trillium), *Lithospermum latifolium* (hoary pucoon) and Uvularia grandiflora (bellwort). Most of these species have never been collected on site.

H. Community Participation

1. The Lab participated in National Public Lands Day, sponsored by Chicago Wilderness, in conjunction with the first fall volunteer harvest. The Kane County Citizens for the Environment helped. The Batavia Women's Club helped out by serving food.
2. Thirty-five students from Jewel Middle School collected fox glove beards-tongue.

3. About 100 students from Wheaton-Warrenville High School helped by hand harvesting in ELM 1 and ELM 25.
4. Fermilab exchanged prairie seeds with the DuPage, DeKalb, Kane, Will, and Kendall Forest Preserve Districts. The exchange program included Elmhurst Prairie, Indian Boundaries Prairie, and West Chicago Prairie Steward Group.
5. Seed was donated to 12 schools and other organizations for educational purposes.
6. The annual spring and Christmas Bird Counts were organized and conducted on site by members of the DuPage Birding Club. The results may be viewed at Christmas Bird Count

III. Recommendations for Calendar Year 2001

The Committee believes that the first priority must be the ongoing maintenance and improvement activities (e.g. mowing, burning, enrichment, redistribution of small trees, and spraying of herbicides) conducted by the Roads and Grounds personnel. These activities are critical to maintaining and building on ecological improvements already achieved. The recommendations below are activities, in addition to maintenance activities, which will further the long range goals already established.

Special Projects

The Committee recommends the following special projects, some of which are already planned.

1. The thistles in RA 2 are becoming a maintenance problem. Only about half of the field is needed each year for hay for the buffalo. The Committee concurs with a recommendation that the tract be maintained by rotating each half, alternately, through a three-year "land management AG License" program.
2. The Committee recommends the Lab consider whether establishing "Experimental Sites" for some threatened plants would introduce a special burden if the operational needs of the Lab dictated construction at that site. Such a program would be undertaken in accordance with the requirements of the Endangered Species Act at 16 USC § 1539(j), and in cooperation with the U.S. Fish and Wildlife Service (U.S FWS) under a Memorandum of Agreement between U.S. DOE and U.S. FWS
3. Many places on site have an increasing population of "undesirable" trees—e.g. cottonwood and willow. In the southern part of ELM 1 and parts of ELM 6 the number and size of these trees is negatively impacting the higher quality prairie development. The MI wetland mitigation area

has many small cottonwood trees. In some places these trees are growing on berms or other places where they have to be removed because of potential impact on the program. Roads and Grounds removes trees as time permits and after obtaining permission from Lab management. The time necessary to get management clearance often precludes using tree removal as "fill-in" work and thus decreases the effectiveness of this part of the land management work. The Committee recommends that the Lab develop a Tree Removal Program. The program could specify the pre-approved conditions for removal of trees. For example, perhaps pre-approval can be granted for the removal of cottonwoods and willows that are less than 6 inches in diameter, located in non-public areas. The Committee suggests that Roads and Grounds, working through their management structure, develop such a program for consideration by the Director.

4. The Committee encourages the on-going attempt to develop working relationships with commercial prairie seed vendors. This relationship may take the form of seed trade or "special AG land licenses". The Committee continues to encourage the Lab to seek and participate in ecological related research that is compatible with the Lab Ecological Land Management Program. The Committee also encourages the Lab to continue to seek interested individuals to conduct ecological surveys. For example, the Butterfly Survey Program by Tom Peterson is a significant addition to the annual surveys being done on-site. Fermilab will participate in the Chicago Wilderness sponsored frog survey in 2001.
5. The committee supports the ongoing efforts to control the white-tailed deer population on the Fermilab site.
6. Cap the Main Injector stockpile with topsoil and native plants.
7. Remove the cyclone fence from both sides of the road in ELM 24.

8. Initiate a program to grind for mulch, the accumulated downed woody vegetation brush piles.
9. Backfill the chlorinator tank adjacent to the Oxidation Pond.
10. Basal treat noxious trees in ELM 1 (Main Ring).
11. Basal treat noxious brush on EJ&E remnant prairie.
12. Complete the Prairie Reconstruction video.
13. Continue with Eagle Scout projects.
14. Install grass waterways in agriculture fields.

B. Recommendations for each ELM Tract

Specific recommendations for each ELM tract are indicated on the ELM Tract Annual Management Plan Sheets which follow. The second column is copied from the Long Range Management Plan. The third column is a copy of the CY 2000 Plan. The fourth column indicates what was done in that tract during CY 2000. The fifth column is the Committee recommendations for CY 2001. The recommendations are based on what the Committee believes is the next logical step in moving towards the long range goal, tempered with the Committee's estimation of what resources may be available during the year.

ELM Tract Annual Management Plan Sheets
Accomplishments Calendar Year 2000 and
Recommendations for Calendar Year 2001
1/13/00

Tract Nbr/Type	Long Range Management Plan	Annual Plan FY 2000	Activities CY 2000	Annual Plan CY 2001
1 Prairie	Continue current enrichment practice of overseeding needed species. Prairie areas should be burned every 2 to 3 years. The cottonwood grove in the far south needs to be removed. The deer exclosure areas will be utilized to conduct experiments.	<u>2000 Plan.</u> No burn*. Control the cottonwood spread in the southern part by a combination of fire, herbicides, and cutting small trees with shears.	<u>2000 Accomplishments.</u> • Enriched with forbs. • Cottonwood control. • Volunteer hand harvest. • Loosestrife control. • Planted prairie violets in oldest section.	<u>2001 Plan.</u> Continue to maintain and enrich. Certain areas in this track are developed enough to begin seeding in late successional species.

2 Woods	The weedy brush should be eliminated. It is recommended that the tract be overseeded with savanna understory species. An annual burn is recommended for the next few years, until underbrush is under control. After that, burning every three years is also recommended.	2000 Plan. Burn* and overseed as resources permit. Continue to herbicide noxious invasive woody species.	2000 Accomplishments. • Overseeded with a savanna mix. • Herbicide undesirable woody species. • Installed screech owl nesting box (by an eagle scout).	2001 Plan. Continue thinning the noxious invasive tree species to increase sunlight to the understory. Seed aggressively with savanna species.
3 Woods	This should be developed as a wet wood. The priority for this area is to study the composition of the forest and develop an intensive management plan.	2000 Plan. As an interim measure to developing an intensive management plan, the tract will be burned* as part of ELM 1. Herbicide noxious invasive woody species.	2000 Accomplishments. • Enriched with forbs. • Installed screech owl nesting box (by an eagle scout).	2001 Plan. Implement a more aggressive development program. Thin the weedy species of trees and shrubs.
4 Prairie	Continued current enrichment practices of overseeding needed species in the prairie areas are recommended. The prairie should be burned every other year. The wooded areas can be burned every 2-3 years, overseeded with woodland understory species and enriched with appropriate trees. The two woods should have different management techniques. The northern section of the prairie area will be developed after the Main Injector construction is finished. Activities in this tract should be coordinated with the NERP researcher (Sluis).	2000 Plan. Poplars should be removed. Overseed the southern part with a wet mesic mix. Check the water table. Burn* for cottonwood control. Examine the northern part for development. Overseed the mitigation area.	2000 Accomplishments. • Southern part and the wetland mitigation area were burned in the spring. • The southern part was enriched with forbs. • White poplars were herbicided fall 2000. • From the existing MI stockpile south and west to Indian Creek was overseeded with prairie matrix. .	2001 Plan. Add topsoil to MI stockpile west side and seed with native prairie species.

5 Brush	This area should be burned in thirds, one third each year. The objective is to maintain the underbrush at a minimum in order to keep this area in an intermediate successional stage. This will preserve a relatively isolated and very diverse scrubby habitat for wildlife. This management technique will sustain one of the few breeding areas for Bell's Vireo and yellow-breasted chats.	2000 Plan. Burn* one third as time permits. Develop a pattern and schedule for burning.	2000 Accomplishments. • No maintenance activity during this period. • Area may require hand cutting of invasive trees to allow sunlight to understory.	2001 Plan. No activity planned. Labor-intensive work needed.
6 Prairie	The primary focus for development should be the wetlands. However, there is opportunity for some prairie development in the southern part.	2000 Plan. Mow and maintain as needed until resources are available for development.	2000 Accomplishments. Mowed.	2001 Plan. Mow.
7 NERP	To maximize the usefulness for potential future research, it is suggested that the prairie areas be burned and enriched as resources permit. The pasture grasses should be mowed or burned to discourage intrusion of brush, exotics, and trees.	2000 Plan. Burn* as time permits.	2000 Accomplishments. • Fallow areas were mowed. • Prairie was mowed. • Non-prairie areas added to agricultural land lease agreement.	2001 Plan. Burn* prairie areas. Mow non-prairie areas.
8 NERP	To maximize the usefulness for potential future research, it is suggested that the prairie areas be burned and enriched as resources permit. The pasture grasses should be mowed or burned to discourage intrusion of brush, exotics, and trees.	2000 Plan. Burn* as time permits. Mow entire tract except for NERP experiments.	2000 Accomplishments. • Fallow areas were mowed. • For the third consecutive year, trees seeds (e.g. oaks, hickories, white walnut, hop hornbeam, black walnut) were planted as a natural nursery. • Two additional NERP projects began in this area.	2001 Plan. Mow prairie areas. Mow non-prairie areas. Maintain the tree nursery.

9 Prairie	The priority for this tract is wetland development. Shorelines in this area are degraded, and should be given attention. (Any shoreline work must be coordinated with FESS.) New Prairie reconstruction in the southern portion is a lesser priority. The pasture grass fields should be mowed during the dormant season.	2000 Plan. Mow and maintain.	2000 Accomplishments. • Mowed. • Loosestrife control. • Southeast section leased for agricultural use.	2001 Plan. Mow and maintain.
10 Prairie	It is recommended that management of this area focus strongly on wetland development. There is also opportunity for some new prairie reconstruction.	2000 Plan. Enrich new prairie as resources permit.	2000 Accomplishments. • Mowed.	2001 Plan. Develop the wetland area. Maintain the mesic area. Enrich wetland area with native species.
11 Grass-land	Maintain the grassland cover by mowing every other year or burning. The shrub should be cut. The wetland should be enhanced through burning, control the water levels with Agri-drain on drain tile, and possible plant community enrichment. Selective herbicide application may be used for problem species.	2000 Plan. Mow. Burn* as time permits. Develop wetland only if outside interest and resources are found.	2000 Accomplishments. • Mowed. • Loosestrife control. • Henslow sparrows were discovered nesting in this area.	2001 Plan. Mow to keep out woody invasive species and encourage cool season grasses.
12 NERP	To maximize the usefulness for potential future research, it is suggested that the prairie areas be burned and enriched as resources permit. The pasture grasses should be mowed or burned to discourage intrusion of brush, exotics, and trees.	2000 Plan. Burn* as time permits. Enrich little bluestem area planted in 1999.	2000 Accomplishments. • Fallow areas were mowed. • Firebreaks were mowed around prairie areas. • Two acres of little bluestem planted. • Monitor growth of little blustem.	2001 Plan. Burn* or mow prairie areas. Mow non-prairie areas. Manage the little bluestem field.

13 NERP	To maximize the usefulness for potential future research, it is suggested that the prairie areas be burned and enriched as resources permit. The pasture grasses should be mowed or burned to discourage intrusion of brush, exotics, and trees.	2000 Plan. Burn* as time permits, or mow to control woody invasive species.	2000 Accomplishments. • All areas were mowed. • Southeast 10 acres were leased for agricultural use.	2001 Plan. Burn* or mow prairie areas. Mow non-prairie areas.
14 Brush	Each year roughly 10% of the largest non-native trees in this area should be selected for removal in order to keep this area in an intermediate successional stage. The goal is to preserve a relatively isolated and very diverse scrubby habitat for wildlife. Owl's Nest Woods should be buffered with a brushy edge, grading into a more open scrubby habitat. Shoreline erosion should be managed to protect valuable trees.	2000 Plan. Remove the largest 10% of the non-native trees. Plant more natural species-e.g. nannyberry, hazelnut and hawthorn.	2000 Accomplishments. • Removed about 10% of the largest non-native trees. • Loosestrife control.	2001 Plan. Remove the largest 10% of the non-native trees. Area to be monitored for bird nesting before burning*.
15 Grass-land	To keep stable grassland, it may be necessary to mow annually late in the growing season. Maintenance activities should be scheduled to minimize the impact on nesting of grassland birds when practical.	2000 Plan. Mow as needed.	2000 Accomplishments. • Mowed. • Loosestrife control.	2001 Plan. Mow as needed to control woody invasive species.
16 Grass-land	The tract needs to be burned or mowed to control goldenrod, at a time and in a manner to minimize the impact on the nesting of grassland birds. A search is underway for an optimum technique that both protects the grassland birds and controls the goldenrod.	2000 Plan. Mow east of Eola.	2000 Accomplishments. • Mowed both sides of Eola. • Henslow sparrows nested in this area summer 2000.	2001 Plan. Mow to control broad-leaved weeds and woody invasive species.

17 Grass-land	The tract needs to be burned or mowed to control goldenrod, at a time and in a manner to minimize the impact on the nesting of grassland birds. The optimum technique that both protects the grassland birds and controls the goldenrod is under study.	2000 Plan. Mow.	2000 Accomplishments. • Mowed. • Eastern half of area leased for agricultural use.	2001 Plan. Mow as needed to control woody invasive species.
18 Woods	For aesthetic reasons mow the areas adjacent to Batavia Road and near the Village buildings. No other maintenance is needed. Allow the wooded area to fill in naturally.	2000 Plan. Mow if needed.	2000 Accomplishments. • No maintenance activity during this period.	2001 Plan. No maintenance planned.
19 Grass-land	The Oxidation Pond should be drained and developed as a wetland. The brush along the northeastern shorelines of DUSAF Pond should remain undisturbed. The pasture grass areas should be mowed during the dormant season.	2000 Plan. Mow. Drain the oxidation pond and begin developing it as a wetland. Enrich with native wetland species.	2000 Accomplishments. • Grass areas mowed. • The oxidation pond was drained and planted • Some wetland plant seeds were broadcast to enrich the area. • Teasel was sprayed.	2001 Plan. Mow. Continue development of the Oxidation Pond as a wetland. When appropriate, open pond to DUSAF Lake.
20 Prairie	It is recommended that some new prairie be developed. The remnant should be enriched and the emergent wetland developed.	2000 Plan. Mow.	2000 Accomplishments. • Mowed. • Teasel was sprayed. • 10 acres leased for agricultural use. • Herbicided woody noxious invasive brush in remnant prairie.	2001 Plan. Continue to herbicide brush as time allows. Mow if necessary.
21 NERP	Whenever the current or future NERP projects allow, this tract should be fire managed. Until then, annual mowing where possible would be desirable for brush control.	2000 Plan. Mow fire breaks.	2000 Accomplishments. • Fire breaks mowed under the power lines and around the perimeter. • Unused research equipment completely removed. • Eastern half leased for agricultural use.	2001 Plan. High priority for burning*. Mow if burning* is not practical.
22 Grass-land	The tract should be mowed and overseeded with prairie matrix.	2000 Plan. Mow every other year.	2000 Accomplishments. • No maintenance activity during this period.	2001 Plan. No maintenance planned. Mow as needed.

23 Prairie	The prairie remnant and the proposed 10 additional acres in the southern portion should be enriched and restored. It is of interest to see how the prairie remnant abutting the new area will spread into the new area. The remnant should be managed by fire. The area near Casey's Pond should be overseeded with prairie matrix.	2000 Plan. Plant the new area with prairie mix. Enrich with prairie matrix and forbs.	2000 Accomplishments. • The new area was enriched with a prairie mix. • Part was burned. • Volunteer hand harvest.	2001 Plan. Enrich. Mow as needed. Burn* when fuel load will carry fire.
24 Woods	The goal in this tract is to develop a large area of woods, maximizing the area to edge ratio. First priority is to connect existing wooded areas with future tree plantings to eliminate fragmentation. The woodland understory species should be enriched. Burns should be conducted every 2 or 3 years; the frequency should be determined in part by the prevalence of garlic mustard, or other invasive species. Restore the spoil area along Giese Road.	2000 Plan. Determine the need for spoil piles for NuMI in ELM 24. If the existing spoil pile areas along Giese Road cannot be used, then continue the restoration of the existing spoil pile areas. Plant trees on Arbor Day north side of tract. Rescue trees as needed from NuMI area. Burn* big woods.	2000 Accomplishments. • About 125 trees were planted during Arbor Day activities. • Understory mix was planted to enrich the woods. • Seed was harvested from the prairie area. • Machine harvest. • Teasel was sprayed. • Buckthorn and honeysuckle control. • Northeast field leased for agricultural use.	2001 Plan. Plant trees on Arbor Day. Continue vegetation studies related to the deer management program. Enrich the understory. Evaluate the need for burning*.
25 Prairie	Continue the current enrichment practices of overseeding needed species in the reconstructed prairies. Continue the practice of moving plants (hepaticas etc.) in Morgan's Woods that are threatened by Kirk Road construction. Newer prairie areas should be burned every year. Older areas every other year.	2000 Plan. Machine harvest will be conducted in this prairie area. Burn* the prairie. Enrich the prairie--drill where the prairie is burned, broadcast other areas.	2000 Accomplishments. • Parts were enriched. • Machine harvest. • Teasel was sprayed. • Buckthorn and honeysuckle control.	2001 Plan. Enrich. Continue management.

26 Prairie	New prairie reconstruction is recommended for pasture grass fields. Continue enrichment of the existing prairies, burning every 2 to 3 years.	<u>2000 Plan.</u> Continue to develop the prairie.	<u>2000 Accomplishments.</u> • Firebreaks were mowed. • Volunteer hand harvest. • Teasel was sprayed.	<u>2001 Plan.</u> Continue management.
27 Woods	Connect fragmented wooded areas with future tree plantings. The understory should be enriched. The adjacent wetlands should be maintained and enhanced.	<u>2000 Plan.</u> Nothing.	<u>2000 Accomplishments.</u> • No maintenance activity during this period.	<u>2001 Plan.</u> No maintenance planned.
28 Prairie	The recommended management is annual burning with intensive enrichment as available resources permit.	<u>2000 Plan.</u> Burn* if time is available. Mow if burning is not done. Enrich the prairie.	<u>2000 Accomplishments.</u> • The prairie was enriched and burned. • Machine harvest.	<u>2001 Plan.</u> Enrich and burn*.

* Pending approval of application for a local exemption to the Department of Energy's nationwide ban on prescribed burning. Submitted Feb. 2001.